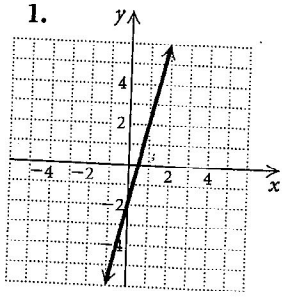
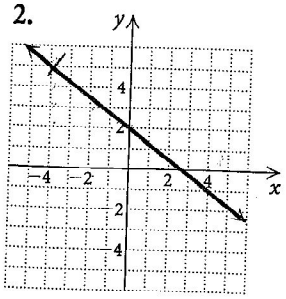
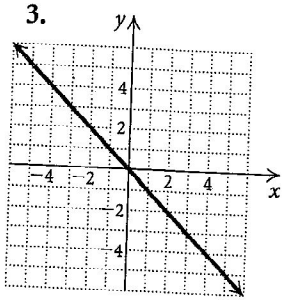
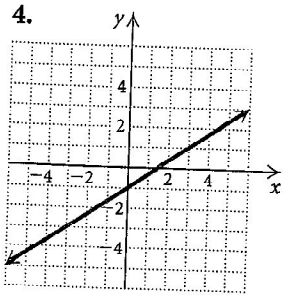
1.4 Exercise Set

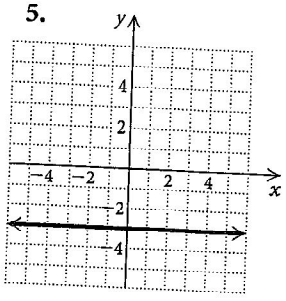
Find the slope and the y-intercept of the graph of the linear equation. Then write the equation of the line in slope–intercept form.

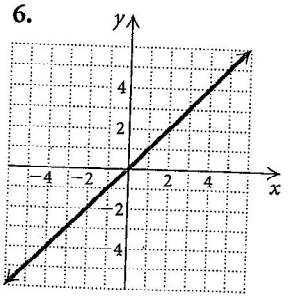
1. 

2. 

3. 

4. 

5. 

6. 

Write a slope–intercept equation for a line with the given characteristics.

7. $m = \frac{2}{9}$, y-intercept $(0, 4)$
8. $m = -\frac{3}{8}$, y-intercept $(0, 5)$
9. $m = -4$, y-intercept $(0, -7)$
10. $m = \frac{2}{7}$, y-intercept $(0, -6)$
11. $m = -4.2$, y-intercept $\left(0, \frac{3}{4}\right)$
12. $m = -4$, y-intercept $\left(0, -\frac{3}{2}\right)$
13. $m = \frac{2}{9}$, passes through $(3, 7)$
14. $m = -\frac{3}{8}$, passes through $(5, 6)$
15. $m = 0$, passes through $(-2, 8)$
16. $m = -2$, passes through $(-5, 1)$
17. $m = -\frac{3}{5}$, passes through $(-4, -1)$
18. $m = \frac{2}{3}$, passes through $(-4, -5)$
19. Passes through $(-1, 5)$ and $(2, -4)$
20. Passes through $\left(-3, \frac{1}{2}\right)$ and $\left(1, \frac{1}{2}\right)$
21. Passes through $(7, 0)$ and $(-1, 4)$
22. Passes through $(-3, 7)$ and $(-1, -5)$
23. Passes through $(0, -6)$ and $(3, -4)$
24. Passes through $(-5, 0)$ and $\left(0, \frac{4}{5}\right)$
25. Passes through $(-4, 7.3)$ and $(0, 7.3)$
26. Passes through $(-13, -5)$ and $(0, 0)$

Write equations of the horizontal lines and the vertical lines that pass through the given point.

27. $(0, -3)$
28. $\left(-\frac{1}{4}, 7\right)$
29. $\left(\frac{2}{11}, -1\right)$
30. $(0.03, 0)$
31. Find a linear function h given $h(1) = 4$ and $h(-2) = 13$. Then find $h(2)$.
32. Find a linear function g given $g\left(-\frac{1}{4}\right) = -6$ and $g(2) = 3$. Then find $g(-3)$.
33. Find a linear function f given $f(5) = 1$ and $f(-5) = -3$. Then find $f(0)$.
34. Find a linear function h given $h(-3) = 3$ and $h(0) = 2$. Then find $h(-6)$.

Determine whether the pair of lines is parallel, perpendicular, or neither.

35. $y = \frac{26}{3}x - 11$, $y = -\frac{3}{26}x - 11$
36. $y = -3x + 1$, $y = -\frac{1}{3}x + 1$

37. $y = \frac{2}{5}x - 4$, $y = -\frac{2}{5}x + 4$

38. $y = \frac{3}{2}x - 8$, $y = 8 + 1.5x$

39. $x + 2y = 5$, $2x + 4y = 8$

40. $2x - 5y = -3$, $2x + 5y = 4$

41. $y = 4x - 5$, $4y = 8 - x$

42. $y = 7 - x$, $y = x + 3$

Write a slope–intercept equation for a line passing through the given point that is parallel to the given line. Then write a second equation for a line passing through the given point that is perpendicular to the given line.

43. $(3, 5)$, $y = \frac{2}{7}x + 1$

44. $(-1, 6)$, $f(x) = 2x + 9$

45. $(-7, 0)$, $y = -0.3x + 4.3$

46. $(-4, -5)$, $2x + y = -4$

47. $(3, -2)$, $3x + 4y = 5$

48. $(8, -2)$, $y = 4.2(x - 3) + 1$

49. $(3, -3)$, $x = -1$

50. $(4, -5)$, $y = -1$

In Exercises 51–56, determine whether the statement is true or false.

51. The lines $x = -3$ and $y = 5$ are perpendicular.

52. The lines $y = 2x - 3$ and $y = -2x - 3$ are perpendicular.

53. The lines $y = \frac{2}{5}x + 4$ and $y = \frac{2}{5}x - 4$ are parallel.

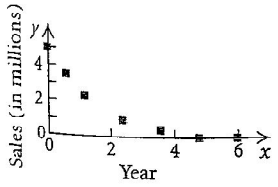
54. The intersection of the lines $y = 2$ and $x = -\frac{3}{4}$ is $\left(-\frac{3}{4}, 2\right)$.

55. The lines $x = -1$ and $x = 1$ are perpendicular.

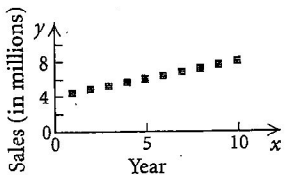
56. The lines $2x + 3y = 4$ and $3x - 2y = 4$ are perpendicular.

In Exercises 57–60, determine whether a linear model might fit the data.

57.



58.



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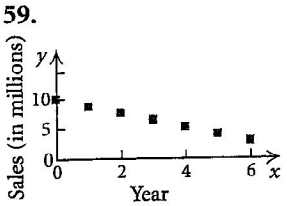
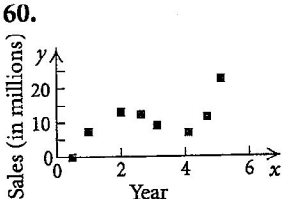


60.



61. *Twin Births.* The table below illustrates the upward trend in twin births.

a) Model the data with a linear function. Let the independent variable represent the number of years after 1990; that is, the data points are (0, 93.8), (5, 96.7), and so on. Answers may vary depending on the data points used.

b) With the function found in part (a), estimate the number of twin births in 2009 and in 2012.

Year, x	Number of Twin Births, y (in thousands)
1990, 0	93.8
1995, 5	96.7
2000, 10	118.9
2001, 11	121.2
2002, 12	125.1
2003, 13	128.7
2004, 14	139.2

Source: National Center for Health Statistics, *National Vital Statistics Reports*, vol 54, no. 2, Sept. 8, 2005

62. *Triplet Births.* The table on the following page illustrates the trend in triplet births in recent years.

a) Model the data given in the table below with a linear function. Let the independent variable represent the number of years after 1990. Answers may vary depending on the data points used.

b) With the function found in part (a), estimate the number of triplet births in 2009 and in 2012.

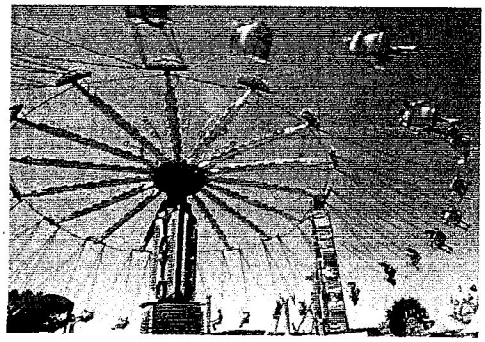
Year, x	Number of Triplet Births, y
1990, 0	2830
1995, 5	4551
2000, 10	6742
2001, 11	6885
2002, 12	6898
2003, 13	7110
2004, 14	6750

Source: National Center for Health Statistics, *National Vital Statistics Reports*, vol 54, no. 2, Sept. 8, 2005

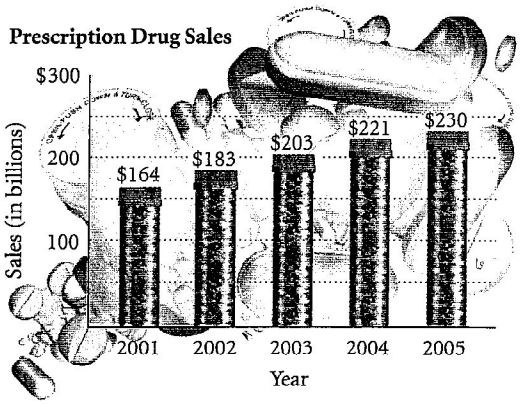
63. *Theme Park Attendance.* Model the data given in the table below with a linear function. Then estimate the attendance at U.S. amusement/theme parks in 2006 and predict the attendance in 2010. Answers may vary depending on the data points used.

Year, x	Amusement/Theme Park Attendance (in millions)
1995, 0	280
1997, 2	300
2000, 5	317
2001, 6	319
2002, 7	324
2003, 8	322
2004, 9	328
2005, 10	335

Source: International Association of Amusement Parks and Attractions



64. *Prescription Drug Sales.* The following graph illustrates the retail sales of prescription drugs for certain years. Model the data with a linear function, estimate the total sales for 2007, and predict the total sales for 2011. Let x = the number of years after 2001. Answers may vary depending on the data points used.



Source: U.S. Bureau of the Census

65. *Social-Security Benefits.* Model the data given in the table below with a linear function, estimate the average monthly social-security benefits for retired workers in 2009, and predict the average benefits in 2012 and in 2020. Answers may vary depending on the data points used.

Year, x	Average Monthly Social-Security Benefits for Retired Workers, y
1970, 0	$124
1980, 10	321
1990, 20	551
2000, 30	845
2003, 33	922
2004, 34	930
2005, 35	955
2006, 36	1011
2007, 37	1044

Source: Social Security Administration, *Social Security Bulletin: Annual Statistical Supplement*, 2006

66. *Sheep and Lambs.* The number of sheep and lambs on farms in the United States has declined in recent years. Model the data given in the table on the following page with a linear function and estimate the number of sheep and lambs on

farms in 2008 and in 2013. Answers may vary depending on the data points used.

Year, x	Sheep and Lambs on Farms in the United States, y (in millions)
1970, 0	20.423
1975, 5	14.515
1980, 10	12.699
1985, 15	10.716
1990, 20	11.358
1995, 25	8.886
2000, 30	7.032
2005, 35	6.135

Source: National Agricultural Statistics Service, U.S. Department of Agriculture

67. *Maximum Heart Rate.* A person who is exercising should not exceed his or her maximum heart rate, which is determined on the basis of that person's sex, age, and resting heart rate. The following table relates resting heart rate and maximum heart rate for a 20-year-old man.

Resting Heart Rate, H (in beats per minute)	Maximum Heart Rate, M (in beats per minute)
50	166
60	168
70	170
80	172

Source: American Heart Association

a) Use a graphing calculator to model the data with a linear function.
b) Estimate the maximum heart rate if the resting heart rate is 40, 65, 76, and 84.
c) What is the correlation coefficient? How confident are you about using the regression line to estimate function values?

68. *Study Time versus Grades.* A math instructor asked her students to keep track of how much time each spent studying a chapter on functions in her algebra–trigonometry course. She collected the information together with test scores from that chapter's test. The data are listed in the following table.

Study Time, x (in hours)	Test Grade, y (in percent)
23	81%
15	85
17	80
9	75
21	86
13	80
16	85
11	93

a) Use a graphing calculator to model the data with a linear function.
b) Predict a student's score if he or she studies 24 hr, 6 hr, and 18 hr.
c) What is the correlation coefficient? How confident are you about using the regression line to predict function values?

69. *Filing Tax Returns Electronically.* The number of tax returns filed electronically in 2005 reflects an increase of approximately 480% over the number of electronic returns in 1995.

Year, x	Number of Tax Returns Filed Electronically, y (in millions)
1995, 0	11.807
1997, 2	19.136
1999, 4	29.349
2001, 6	40.245
2003, 8	52.945
2005, 10	68.476

Source: *2005 IRS Data Book*